

# Genome Sequence of *Stenotrophomonas maltophilia* Strain AU12-09, Isolated from an Intravascular Catheter

Li Zhang,<sup>a</sup> Mark Morrison,<sup>b</sup> Páiraic Ó Cuív,<sup>b</sup> Paul Evans,<sup>a</sup> Claire M. Rickard<sup>a</sup>

Health Practice Innovation, Griffith University, Brisbane, Australia<sup>a</sup>; CSIRO Livestock Industries, Queensland BioScience Precinct, Brisbane, Australia<sup>b</sup>

***Stenotrophomonas maltophilia* is an opportunistic nosocomial pathogen that is characterized by its high-level intrinsic resistance to a variety of antibiotics and its ability to form biofilms. Here, we report the draft genome sequence of *Stenotrophomonas maltophilia* AU12-09, isolated from an intravascular catheter tip.**

Received 17 March 2013 Accepted 22 March 2013 Published 2 May 2013

**Citation** Zhang L, Morrison M, Ó Cuív P, Evans P, Rickard CM. 2013. Genome sequence of *Stenotrophomonas maltophilia* strain AU12-09, isolated from an intravascular catheter. *Genome Announc.* 1(3):e00195-13. doi:10.1128/genomeA.00195-13.

**Copyright** © 2013 Zhang et al. This is an open-access article distributed under the terms of the [Creative Commons Attribution 3.0 Unported license](https://creativecommons.org/licenses/by/3.0/).

Address correspondence to Li Zhang, [li.zhang@griffith.edu.au](mailto:li.zhang@griffith.edu.au).

*Stenotrophomonas maltophilia* was first isolated in 1943 as *Bacterium bookeri* and was then named *Pseudomonas maltophilia* (1). Later, however, investigators using rRNA cistron analysis determined that this microorganism was more appropriately named *Xanthomonas maltophilia*. More recently, DNA-rRNA hybridization studies and sequencing and mapping of PCR-amplified 16S rRNA genes have resulted in the classification and naming of *X. maltophilia* as *Stenotrophomonas maltophilia* (2). *S. maltophilia* is predominantly found in an aquatic or humid environment, and in hospitals, *S. maltophilia* is found as a contaminant of numerous medical devices, edetic acid anticoagulant in vacuum tubes for blood collection, chlorhexidine-cetrimide disinfectant, and sterile water (3).

*S. maltophilia* is the third most common nosocomial nonfermenting Gram-negative bacillus (4). A recent study shows that 4.3% of almost 75,000 Gram-negative infections were caused by *S. maltophilia* in intensive care units in the United States (5). The two most common diseases caused by *S. maltophilia* are bacteremia and pneumonia, with infection being via an intravascular catheter or ventilator, respectively (5). In addition, *S. maltophilia* is intrinsically resistant to a variety of clinically prescribed antibiotics (3). Also, *S. maltophilia* can form biofilms, which further increases its resistance to phagocytes and antibiotics (3).

*S. maltophilia* strain AU12-09 was isolated from an intravascular catheter tip by rolling the tip back and forth on the surface of a Columbia agar plate supplemented with 5% sheep blood, essentially as described by Maki et al. (6). DNA was prepared and the genome sequence of *S. maltophilia* AU12-09 was determined on a 454 GS FLX system using titanium chemistry (Roche) (7). The sequence data consist of 129,784,052 bp of DNA sequence at 29× coverage. A total of 125 contigs (>500 bp) were *de novo* assembled using the Roche GS *de novo* assembler (version 2.3). The contig N<sub>50</sub> was 69,081 bp, and the largest contig assembled was 320,581 bp. The contigs were then ordered and oriented into four scaffolds using paired-end information. The average length of the scaffolds was 1,145,290 bp.

The draft genome of *S. maltophilia* AU12-09 consists of a circular 4,547,300-bp chromosome with a G+C content of 66.5%.

The genome was automatically annotated using the RAST server (8). The genome contains 70 tRNA genes coding for all amino acids and 4,004 predicted protein-coding genes, consistent with other sequenced *Stenotrophomonas* spp. (5, 9). We identified numerous putative virulence factors, including those involved in quorum sensing, biofilm formation, and the production of bacteriocins and invasins. The *S. maltophilia* AU12-09 genome contains 24 genes coding for multidrug resistance efflux pumps, 11 genes coding for resistance to beta-lactam antibiotics, 5 genes coding for multidrug resistance tripartite systems, and 4 genes coding for resistance to fluoroquinolones.

This sequence information for the *S. maltophilia* genome will greatly improve our understanding of the drug resistance and pathogenicity of this organism.

**Nucleotide sequence accession number.** The genome sequence of *S. maltophilia* AU12-09 has been deposited in NCBI GenBank under accession no [APIT00000000](https://www.ncbi.nlm.nih.gov/nuccore/APIT00000000).

## ACKNOWLEDGMENT

L.Z. is supported by an NHMRC training clinical research fellowship (Australian Government grant number 597491).

## REFERENCES

1. Denton M, Kerr KG. 1998. Microbiological and clinical aspects of infection associated with *Stenotrophomonas maltophilia*. *Clin. Microbiol. Rev.* 11:57–80.
2. Brooke JS. 2012. *Stenotrophomonas maltophilia*: an emerging global opportunistic pathogen. *Clin. Microbiol. Rev.* 25:2–41.
3. Looney WJ, Narita M, Mühlemann K. 2009. *Stenotrophomonas maltophilia*: an emerging opportunist human pathogen. *Lancet Infect. Dis.* 9:312–323.
4. Falagas ME, Valkimadi PE, Huang YT, Matthaïou DK, Hsueh PR. 2008. Therapeutic options for *Stenotrophomonas maltophilia* infections beyond co-trimoxazole: a systematic review. *J. Antimicrob. Chemother.* 62: 889–894.
5. Crossman LC, Gould VC, Dow JM, Vernikos GS, Okazaki A, Sebahia M, Saunders D, Arrowsmith C, Carver T, Peters N, Adlem E, Kerhornou A, Lord A, Murphy L, Seeger K, Squares R, Rutter S, Quail MA, Rajandream MA, Harris D, Churcher C, Bentley SD, Parkhill J, Thomson NR, Avison MB. 2008. The complete genome, comparative and functional analysis of *Stenotrophomonas maltophilia* reveals an organism heavily shielded by drug resistance determinants. *Genome Biol.* 9:R74.

6. Maki DG, Weise CE, Sarafin HW. 1977. A semiquantitative culture method for identifying intravenous-catheter-related infections. *N. Engl. J. Med.* 296:1305–1309.
7. Margulies M, Egholm M, Altman WE, Attiya S, Bader JS, Bemben LA, Berka J, Braverman MS, Chen YJ, Chen Z, Dewell SB, Du L, Fierro JM, Gomes XV, Godwin BC, He W, Helgesen S, Ho CH, Ho CH, Irzyk GP, Jando SC, Alenquer ML, Jarvie TP, Jirage KB, Kim JB, Knight JR, Lanza JR, Leamon JH, Lefkowitz SM, Lei M, Li J, Lohman KL, Lu H, Makhijani VB, McDade KE, McKenna MP, Myers EW, Nickerson E, Nobile JR, Plant R, Puc BP, Ronan MT, Roth GT, Sarkis GJ, Simons JF, Simpson JW, Srinivasan M, Tartaro KR, Tomasz A, Vogt KA, Volkmer GA, Wang SH, Wang Y, Weiner MP, Yu P, Begley RF, Rothberg JM. 2005. Genome sequencing in microfabricated high-density picolitre reactors. *Nature* 437:376–380.
8. Aziz RK, Bartels D, Best AA, DeJongh M, Disz T, Edwards RA, Formsma K, Gerdes S, Glass EM, Kubal M, Meyer F, Olsen GJ, Olson R, Osterman AL, Overbeek RA, McNeil LK, Paarmann D, Paczian T, Parrello B, Pusch GD, Reich C, Stevens R, Vassieva O, Vonstein V, Wilke A, Zagnitko O. 2008. The RAST server: rapid annotations using subsystems technology. *BMC Genomics* 9:75.
9. Zhu B, Liu H, Tian WX, Fan XY, Li B, Zhou XP, Jin GL, Xie GL. 2012. Genome sequence of *Stenotrophomonas maltophilia* RR-10, isolated as an endophyte from rice root. *J. Bacteriol.* 194:1280–1281.